



RELEASED ITEMS

**SCIENCE
GRADE 8**

Fall 2006

**MICHIGAN STATE BOARD OF EDUCATION
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PART 1

DIRECTIONS

In this test, you will demonstrate your understanding of science.

This test includes both multiple-choice and written-response questions. For the multiple-choice questions, use only a No. 2 pencil to mark your answers. Make a dark mark that completely fills the corresponding circle in your **Answer Document**. If you are not sure of the answer to a multiple-choice question, mark your *best* choice and go on to the next question. If you change an answer, be sure to erase the first mark completely. Remember, mark only one answer for each question.

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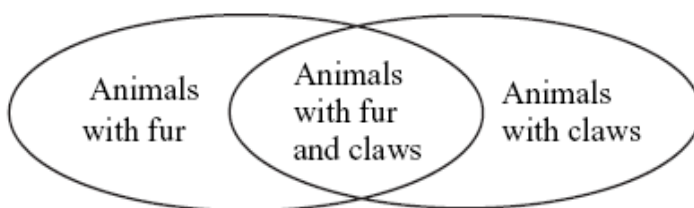
If you do not understand any of these directions, please raise your hand.

You may now begin.

1 The main function of leaf cells is

- A movement.
- B reproduction.
- C photosynthesis.
- D disease-fighting.

2 A student has drawn the diagram below in science class.

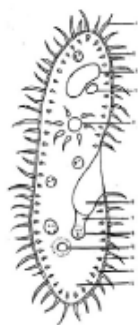


The student has *most likely* drawn this diagram to

- A illustrate a food chain.
- B attempt to classify organisms.
- C determine the number of organisms in a population.
- D represent different stages in the life cycle of an organism.

- 3 A scientist crossed a pea plant that produces yellow peas with wrinkled seeds and a pea plant that produces green peas with smooth seeds. The resulting offspring were yellow peas with smooth seeds, indicating that
- A offspring acquire traits randomly.
 - B offspring never inherit traits from their parents.
 - C offspring inherit traits from both parents.
 - D offspring inherit traits from only one parent.
- 4 Scientists have used genetic engineering to produce new types of grains and vegetables. These grains and vegetables can live in hot temperatures. This research is beneficial to humans because the research
- A could eliminate the need to fertilize crops.
 - B makes crops more resistant to pollutants.
 - C shows these crops are less likely to be infested by insects and other pests.
 - D indicates that these crops may grow in hot, dry areas.
- 5 What percentage of its chromosomes does a sperm cell contribute to a new embryo?
- A 25%
 - B 50%
 - C 75%
 - D 100%

6



Paramecium

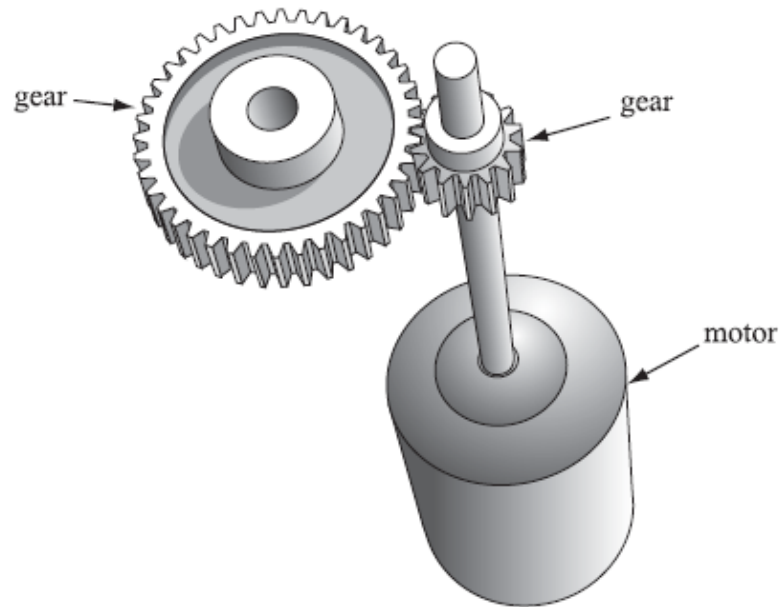


Sweet Pea

How are the organisms above similar to each other?

- A** They are both plants.
- B** They are both cellular.
- C** They are both vertebrates.
- D** They are both cold-blooded.

7

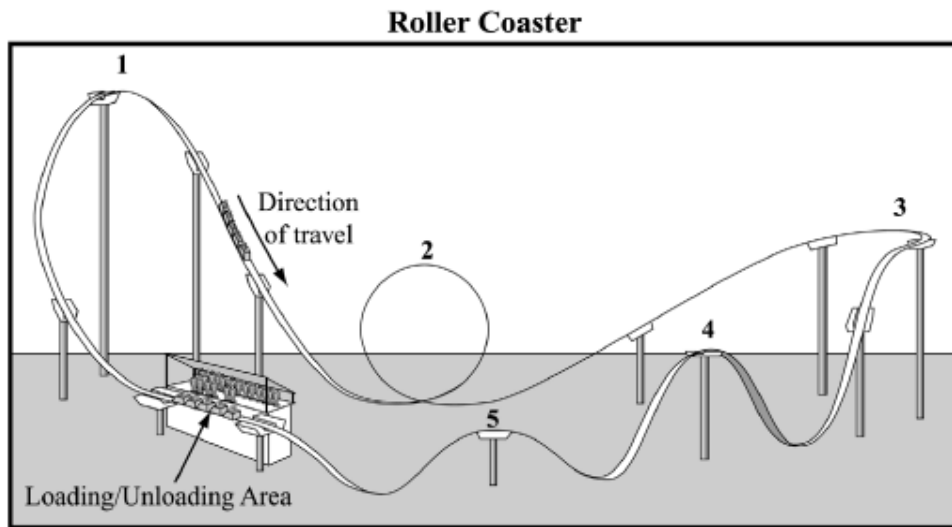


The picture above shows a set of gears. The smaller gear is connected to a motor. When the motor is turned on, the smaller gear begins to turn and that causes the larger gear to turn. Which of the following statements about the motion of the gears is *true*?

- A** When the small gear makes one full turn, the larger gear will have made a full turn.
- B** When the small gear makes one full turn, the larger gear will have made a partial turn.
- C** When the small gear makes one full turn, the larger gear will have made two full turns.
- D** When the small gear makes one full turn, the larger gear will have made three full turns.

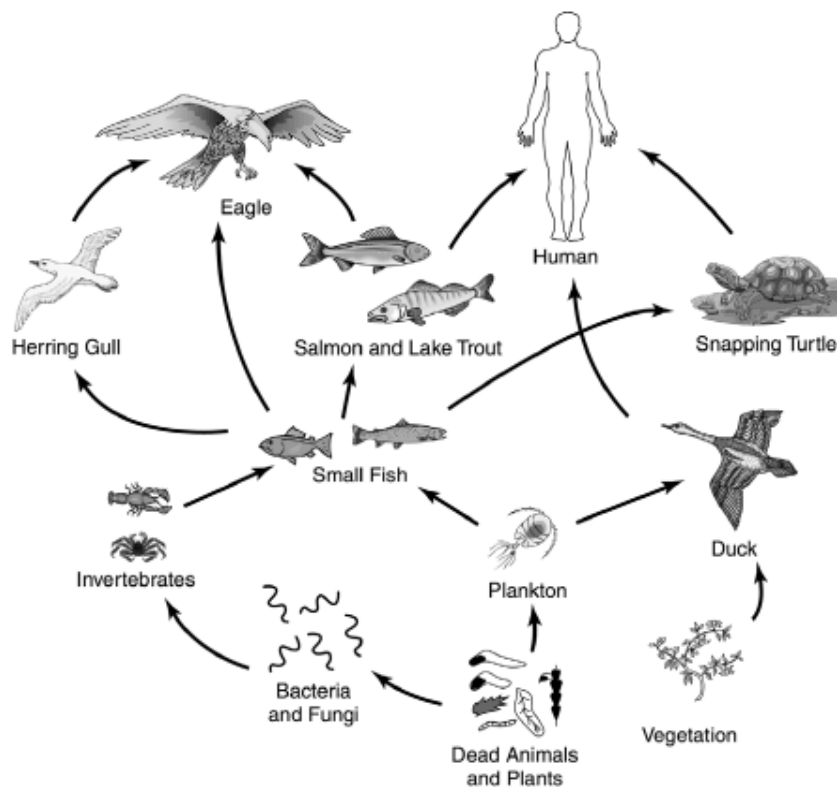
- 8 A student tested the conductivity of four different materials. Which of the materials would have the highest conductivity?
- A glass
 - B rubber
 - C copper
 - D wood chips
- 9 When a bottle is struck with a spoon it produces a sound. The sound waves move in
- A all directions from the source.
 - B only the direction from which the spoon struck the bottle.
 - C only the opposite direction from which the spoon struck the bottle.
 - D any direction away from the bottle, but cannot move through the bottle.
- 10 A mechanical wave with high energy is characterized by a
- A short period.
 - B low amplitude.
 - C high amplitude.
 - D high temperature.

- 11 The picture shows a typical roller coaster found at amusement parks and fairs.



- As the cars approach the top of hill 3, they come into a turn. This causes the cars to
- A** change direction and come to a stop.
 - B** change direction and increase in speed.
 - C** change direction and decrease in speed.
 - D** change direction and maintain constant speed.
- 12 Jamie puts a glass bottle of water into the freezer. When he returns for the water he discovers that the bottle has broken. The bottle broke because
- A** the water expanded in the bottle as it froze.
 - B** the water contracted in the bottle as it froze.
 - C** the air in the bottle began to rise as it cooled.
 - D** the glass could not withstand the temperature in the kitchen freezer.

The picture below shows one possible food web for a Great Lakes ecosystem. Based on your understanding of ecosystems' interactions, answer the following question.



ANSWER THE FOLLOWING CONSTRUCTED-RESPONSE ITEM IN YOUR ANSWER DOCUMENT.

**13 Constructed Response
(3 points)**

Suppose that human beings were removed entirely from the Great Lakes ecosystems.

- Identify **one** organism in the food web that this would have an immediate effect on.
- Describe the effect.
- Explain how this effect could affect another organism or group of organisms.

NOTHING WRITTEN IN THIS TEST BOOKLET WILL BE SCORED.

ANSWER THE FOLLOWING CONSTRUCTED-RESPONSE ITEM IN YOUR ANSWER DOCUMENT.

**14 Constructed Response
(3 points)**

A student records these findings of an experiment in which the same type of bean plant was grown under different colors of light.

Effects of Light Color on Bean Plants

Bean Plant	Light Color	Starch Present in Leaf
1	White	91 mg
2	Yellow	10 mg
3	Green	13 mg
4	Blue	68 mg
5	Red	72 mg
6	No Light	4 mg




- Draw a scientific conclusion based on the data above.
- Explain how the data from the experiment supports your conclusion.
- Describe a way to gather more evidence to support your conclusion.

NOTHING WRITTEN IN THIS TEST BOOKLET WILL BE SCORED.

15 Which of the following is the product of a chemical change?


- A ice
- B rust
- C sawdust
- D salt water

16 Meteorologists have predicted the following weather for Alpena over three days.


<p>Wednesday High 67°F Low 43°F</p>  <p>Partly cloudy 30% chance of rain</p>	<p>Thursday High 72°F Low 49°F</p>  <p>Partly cloudy 10% chance of rain</p>	<p>Friday High 77°F Low 52°F</p>  <p>Mostly sunny 0% chance of rain</p>
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If the weather trend continues, what will Saturday's forecast *most likely* look like?


- A** High 65°F
 Low 38°F




Thunderstorms
100% chance of rain
- B** High 77°F
 Low 58°F



Mostly cloudy
50% chance of rain
- C** High 81°F
 Low 58°F



Clear
0% chance of rain
- D** High 95°F
 Low 81°F



Partly cloudy
10% chance of rain

Use the information below to answer questions 17 through 20.

While preparing to cook some pasta, Antoine noticed that the directions on the package said to add a tablespoon of salt to the water before boiling the pasta. He wondered what effect the salt would have on the temperature at which the water boils. Antoine thought that adding salt to the water would probably cause it to boil at a higher temperature. He decided to perform an experiment to see if he was correct. Under adult supervision, Antoine used a thermometer to determine the temperature of the water in each pot. He then added 2 grams of salt to one of the pots (B) and 4 grams of salt to another pot (C). Pots B and C both stopped boiling briefly. When they came back to a boil he took the temperature of each pot again. Antoine's data are recorded in the table below.

Temperature Results

Pot	Temperature (°C) at first boil	Salt (grams)	Temperature (°C) at second boil
A	100.3	0	100.3
B	100.3	2	103.9
C	100.3	4	105.7

- 17 Based on his experiment, Antoine thinks that adding sugar to water would produce the same results as the salt. This idea is *best* referred to as
- A a hypothesis.
 - B an evaluation.
 - C a conclusion.
 - D an observation.

- 18 The *best* way for Antoine to verify that his results are accurate is to
- A show the results to his teacher.
 - B submit the results to the science fair.
 - C repeat the experiment under identical conditions.
 - D repeat the experiment using sugar instead of salt.
- 19 Based on the results of the experiment, the *most* logical conclusion for why the pasta directions suggested adding salt to the water before boiling the pasta is
- A to keep the water from evaporating too quickly.
 - B so that you don't have to add salt to the pasta after cooking it.
 - C because the higher boiling temperature will cook the pasta faster.
 - D to increase the density of the water so it won't boil over and out of the pot.

ANSWER THE FOLLOWING CONSTRUCTED-RESPONSE ITEM IN YOUR ANSWER DOCUMENT.

- 20 **Constructed Respons**
(3 points)
- What is the question being answered in this investigation?
 - What is the hypothesis that Antoine formed?
 - Explain how the data support the hypothesis.

NOTHING WRITTEN IN THIS TEST BOOKLET WILL BE SCORED.

- 21 Why are cloudy skies less common over deserts?
- A High humidity prevents cloud formation.
 - B Constant winds keep water from evaporating.
 - C There is not enough moisture in the air for clouds to form.
 - D Evaporation rates in the desert are much higher than other places.
- 22 Which of the following will *most likely* happen when groundwater is used up more quickly than it can be replaced?
- A wells go dry
 - B runoff increases
 - C water table rises
 - D soil becomes saturated
- 23 Which of the following is *least likely* to be a source of water pollution?
- A agricultural runoff
 - B household dumping
 - C acid rain
 - D over-pumping of water from wells
- 24 In layers of sedimentary rock that have not been disturbed, the youngest layer is the one
- A at the top.
 - B at the bottom.
 - C containing fossils.
 - D containing gravel.

PART 2

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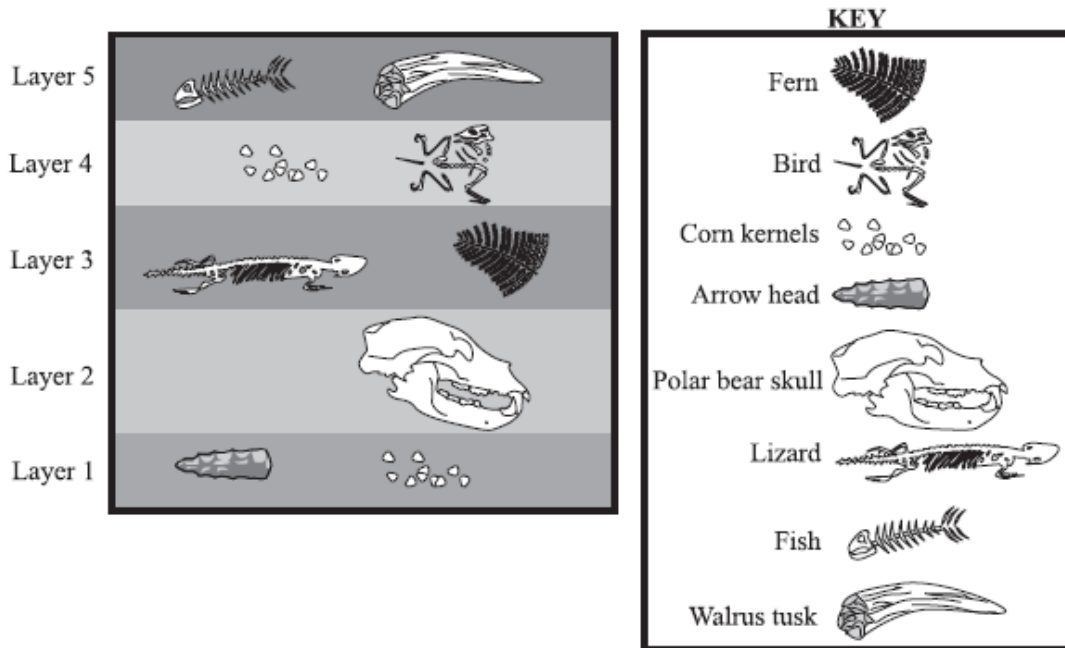
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When the shadows of the house and trees appear as shown in the picture above, the sun is *most likely*

- A in full eclipse.
 - B hidden behind clouds.
 - C to the east of the house.
 - D to the west of the house.
- 26 What is the *primary* source of groundwater?
- A dew
 - B runoff
 - C Great Lakes
 - D rainfall
- 27 Wind develops as a result of *differences* in
- A air temperature and humidity.
 - B relative humidity and dew point.
 - C condensation and evaporation rates.
 - D atmospheric pressure and temperature.

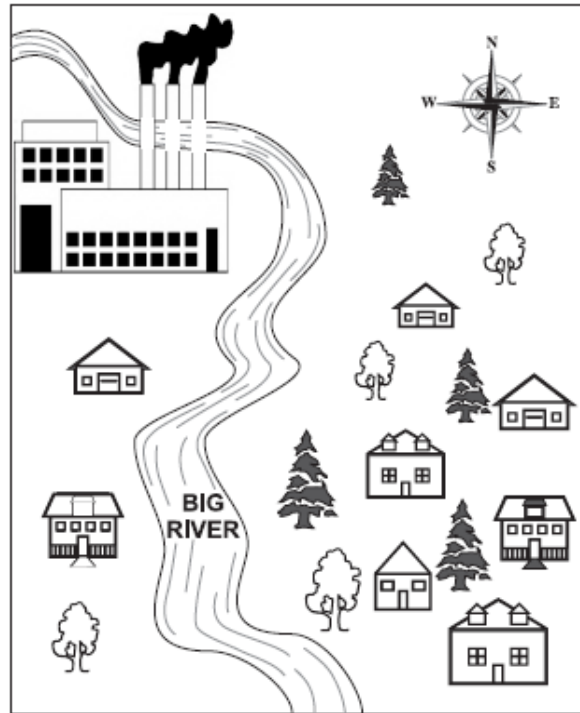
28 The picture below shows a series of rock layers and the fossils and objects they contain.



Which two layers indicate a dramatic temperature change from cold to warm?

- A Layer 1 to Layer 2
- B Layer 2 to Layer 3
- C Layer 3 to Layer 4
- D Layer 4 to Layer 5

29



A factory near the Big River operates every day of the week. Residents to the east of the river frequently complain of eye irritation while residents to the west of the river rarely have problems. What conclusion *best* fits this information?

- A It rains less often on the east side of the river than it does on the west side.
- B It rains more often on the east side of the river than it does on the west side.
- C Smoke from the factory is being carried by winds coming from the southeast.
- D Smoke from the factory is being carried by winds coming from the northwest.

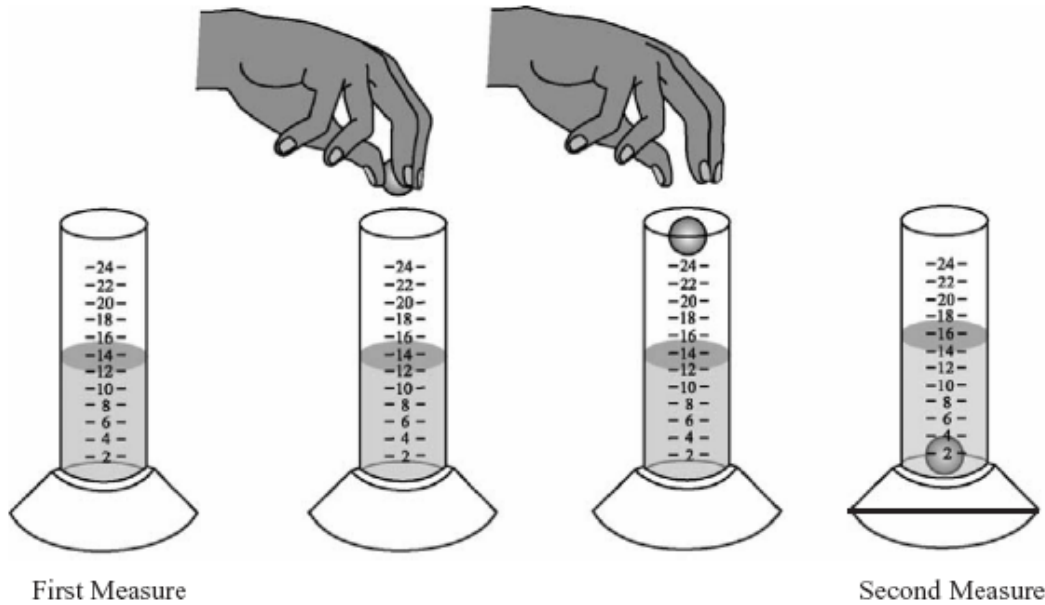
30 Campers see a falling meteor one night. The light from the meteor is

- A** stored light from the sun.
- B** reflected light from the moon.
- C** a result of the meteor's internal heat.
- D** a result of friction with the atmosphere.

31 Glaciers form as a result of

- A** melting and refreezing of snow and ice.
- B** weathering and erosion of snow and ice.
- C** sublimation and condensation of water vapor.
- D** precipitation and compaction of layers of snow.

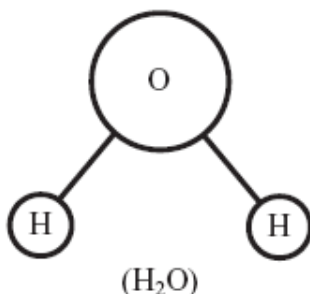
32



Kenyatta pours some water into a graduated cylinder and records the amount. He then drops a marble into the graduated cylinder. This causes the water level to increase and he records the new measure. The difference between Kenyatta's first and second measures equals

- A the area of the marble.
- B the mass of the marble.
- C the volume of the marble.
- D the density of the marble.

33



What is formed when two hydrogen atoms (H) are combined with one oxygen atom (O)?

- A a mixture
 - B a mineral
 - C an element
 - D a compound
- 34 Televisions are required to have grounding plugs. The purpose of a grounding plug is to
- A prevent short circuits.
 - B reduce electrical usage.
 - C reduce the risk of electrical shock.
 - D fit into household electrical outlets.

Use the information below to answer question 35.

A volunteer firefighter living in northern Michigan received an emergency fire call on a March morning. A cold front had recently passed through the area causing air temperature to drop to below freezing and causing some ice on the roadways. As the fireman started his car, he noticed that there was frost on the windshield and he could "see his breath." When he arrived, he noticed that snow near the building had melted and frozen again as ice.

- 35 Heat from the fire caused snow near the building to melt. Once the fire was put out, the melted snow began to freeze, forming a layer of ice. Which of the following *best* describes the changes that took place?
- A Melting is a physical change and freezing is a physical change.
 - B Melting is a chemical change and freezing is a physical change.
 - C Melting is a physical change and freezing is a chemical change.
 - D Melting is a chemical change and freezing is a chemical change.

- 36 The planet Mars is approximately 228 million kilometers from the Sun. Its average temperature is -50°C (-58°F) and it revolves around the Sun once every 687 days. Which of the following inferences is *best* supported by this data?
- A Mars has more daylight hours than Earth.
 - B If there is water on Mars it is most likely frozen.
 - C A year on Mars is the same length as a year on Earth.
 - D There is oxygen in Mars' atmosphere.
- 37 As a hiker moves around in a cave, her compass needle points in various directions. Which of the following reasons *best* describes what is affecting the accuracy of her compass?
- A depth of the cave
 - B lack of light in the cave
 - C iron ore in the cave walls
 - D cooler temperatures in the cave

- 38 Sound travels faster through solids than it does through either liquids or gases. A student could verify this statement by measuring the
- A distance that sound travels through a solid, a liquid, and a gas.
 - B pitch of sound when it passes through a solid, a liquid, and a gas.
 - C time required for sound to travel a set distance through a solid, a liquid, and a gas.
 - D distance sound travels through a solid, a liquid, and a gas at varying temperatures.

Use the information below to answer questions 39 through 42.

Field mice have a varied diet that includes nuts, berries, seeds, and grain. A scientist studying mice places four male field mice in separate but identical cages. Each mouse is offered five different types of food: sunflower seeds, strawberries, rice, walnuts, and blackberries. The scientist then observes and records the feeding behavior of each mouse. The data are recorded in the table below. The number 1 indicates which food each mouse ate first, 2 indicates the second type of food, etc.

Mouse	Sunflower Seeds	Strawberries	Rice	Walnuts	Blackberries
A	3	1	5	4	2
B	4	1	5	3	2
C	3	2	5	4	1
D	3	1	5	4	2

- 39 Based on the experimental design, what question is the scientist *most likely* trying to answer?
- A What type of food do field mice prefer?
 - B Do walnuts affect the behavior of field mice?
 - C How much food do field mice consume annually?
 - D How do seeds affect the reproductive success of field mice?
- 40 Which of the following changes in the experimental design would be *most likely* to affect the results of the experiment?
- A Using four identical, but larger cages.
 - B Using four rats instead of four field mice.
 - C Using differently colored field mice.
 - D Using older field mice than in the first experiment.

Based on information gathered during the scoring process, it has been determined that Item 41 is unusable. Item 41 was not included in the scoring for final reports.

ANSWER THE FOLLOWING CONSTRUCTED-RESPONSE ITEM IN YOUR ANSWER DOCUMENT.

**42 Constructed Response
(3 points)**

The scientist performs the experiment again, under identical conditions and using the same field mice. The data from the second experiment are recorded in the table below.

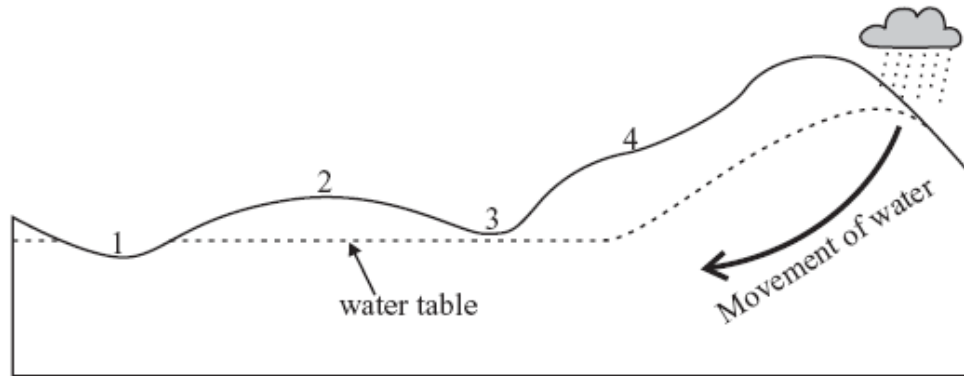
Mouse	Sunflower Seeds	Strawberries	Rice	Walnuts	Blackberries
A	3	1	5	4	2
B	3	2	5	4	1
C	3	2	5	4	1
D	3	1	5	4	2

(The number 1 indicates which food each mouse ate first, 2 indicates the second type of food, etc.)

- Explain why it is important for a scientist to perform an experiment more than once.
- Explain how the second set of data is similar to the first set of data.
- Explain why it is important to keep the conditions the same when performing an experiment again.

NOTHING WRITTEN IN THIS TEST BOOKLET WILL BE SCORED.

43



An oasis is a place in a desert where underground water seeps through to the surface. The figure above shows how water from rainfall in the mountains passes through the porous rock below a desert region. If the dotted line represents the top of the water table, where is the *most likely* place for an oasis to form?

- A 1
 - B 2
 - C 3
 - D 4
- 44 Which of the following is the *best* way for scientists to get information about the evolutionary relationships of different organisms?
- A examining their habitat
 - B observing how long they live
 - C comparing their physical structures
 - D determining how many offspring they produce
- 45 Which of the following conditions is *least likely* to affect a plant's ability to perform photosynthesis?
- A little water availability
 - B nutrient-poor soil
 - C low wind speed
 - D cloudy skies

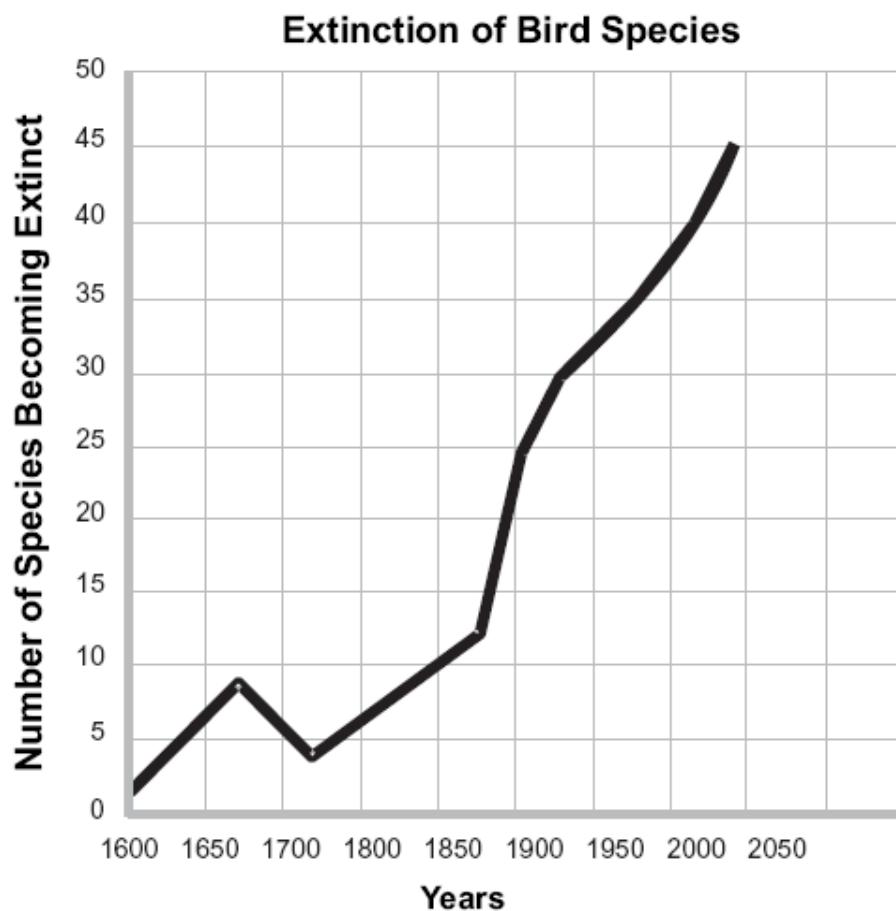
46

**Hummingbird**

Many flowers have special adaptations such as color, scent, and bloom shape to attract specific pollinators. Pollinators are animals that transfer pollen. A hummingbird is a type of pollinator that drinks the nectar of flowers. Which flower is *best* adapted to limit its pollinators to hummingbirds?

A**B****C****D**

47 The chart below shows the rate of extinction of bird species over a 400-year period.



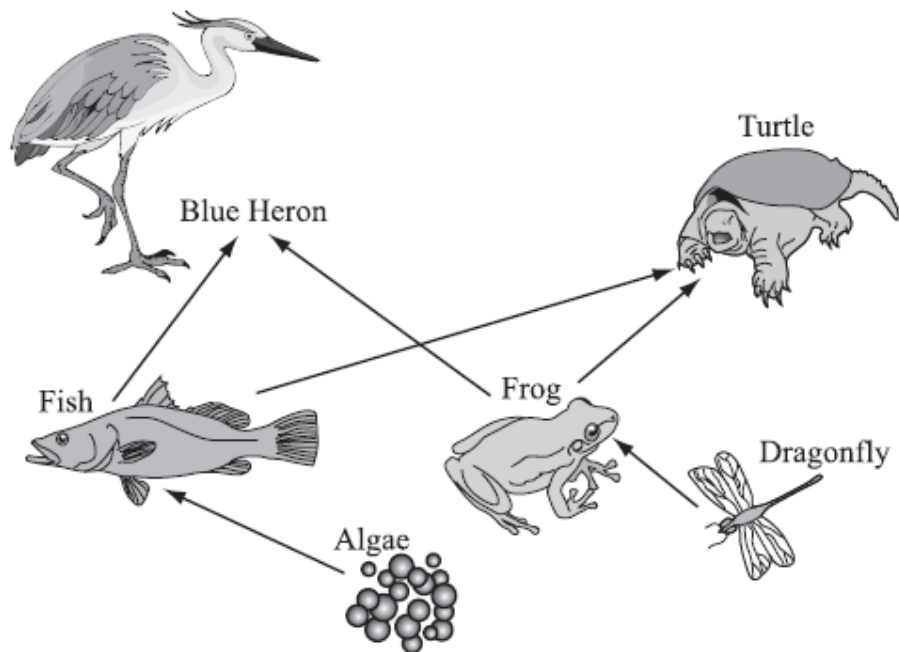
During what year did the smallest number of bird species become extinct?

- A 1600
- B 1670
- C 1730
- D 2000

48 A student is examining some matter under a microscope. What question can the student answer that will *best* allow him to determine if the matter came from a living organism?

- A Is the matter moist?
- B Where was the matter found?
- C Is the matter composed of cells?
- D Does sunlight affect the matter?

49



The picture above shows a Michigan food web. If all the fish disappear from this food web, the immediate effect will be

- A a decrease in both the algae and turtle populations.
- B an increase in algae and a decrease in turtle and blue heron populations.
- C an increase in the frog population and a decrease in the algae population.
- D a decrease in the blue heron population and an increase in the turtle population.

- 50 Which body system is primarily responsible for extracting nutrients from the food we eat?
- A skeletal
 - B digestive
 - C endocrine
 - D circulatory

Scoring Key: Part 1

Item Number	Correct Answer	Standard/ Benchmark	Description
1	C	III.1.m.2	Specialized cells
2	B	III.2.m.1	Classify organisms
3	C	III.3.m.1	Reproduction of genetic material
4	D	II.1.m.4	Advantages and risks of new technologies
5	B	III.3.m.1	Reproduction of genetic material
6	B	III.2.m.1	Classify organisms
7	B	IV.3.m.5	Use forces to move objects
8	C	IV.1.m.5	Explain circuits
9	A	IV.4.m.6	How mechanical waves transmit energy
10	C	IV.4.m.5	Vibrating objects
11	C	IV.3.m.1	Describe motion in 2 dimensions
12	A	IV.2.m.1	Common physical changes
13	CR	II.1.m.3	Common themes
14	CR	I.1.m.2	Conduct investigations
15	B	IV.2.m.2	Common chemical changes
16	C	V.3.m.1	Weather patterns
17	A	I.1.m.2	Conduct investigations
18	C	I.1.m.2	Conduct investigations
19	C	I.1.m.2	Conduct investigations
20	CR	I.1.m.2	Conduct investigations
21	C	V.3.m.3	Water cycle
22	A	V.2.m.3	Groundwater
23	D	V.2.m.4	Origins of water pollution
24	A	V.1.m.4	Geological history of Earth

Scoring Key: Part 2

Item Number	Correct Answer	Standard/ Benchmark	Description
25	C	V.4.m.2	Motion of solar system objects
26	D	V.2.m.3	Groundwater
27	D	V.3.m.1	Weather patterns
28	B	V.1.m.4	Geological history of Earth
29	D	II.1.m.5	Awareness and sensitivity to natural world
30	D	V.4.m.3	Common observations in the night sky
31	D	V.2.m.1	Water in various forms on Earth
32	C	IV.1.m.2	Appropriate units
33	D	IV.1.m.3	Elements, compounds, mixtures
34	C	IV.1.m.6	Electrical devices
35	A	IV.2.m.1	Common physical changes
36	B	II.1.m.1	Strengths and weaknesses of claims or data
37	C	II.1.m.4	Advantages and risks of new technologies
38	C	IV.4.m.1	How sounds travel
39	A	I.1.m.1	Ask questions
40	B	I.1.m.2	Conduct investigations
41	Not Scored		
42	CR	I.1.m.2	Conduct investigations
43	A	V.2.m.1	Water in various forms on Earth
44	C	III.4.m.1	Evolutionary relationships
45	C	III.5.m.2	Energy from sunlight
46	C	II.1.m.3	Common themes
47	A	I.1.m.5	Use sources of information
48	C	III.1.m.1	Living things are made entirely of cells
49	B	II.1.m.3	Common themes
50	B	III.2.m.4	How systems and processes work together in animals

